

Mac TetrUSS 2010 Release Notes

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Note: This software was developed by the U.S. Government and is for authorized users of Mac OS X TetrUSS only. Unauthorized use, dissemination, or export of this software is a violation of federal law.

System Requirements

TetrUSS 2010 requires Mac OS X 10.4-10.6 with X11 installed. A three button mouse (with buttons set to the standard UNIX defaults) is recommended for GTC, VGRID, and POSTGRID.

Installation

Before installing, manually remove or rename any existing TetrUSS folder in /Applications. To install TetrUSS, double click on the "TetrUSS_2010.mpkg" file. An admin password is required. The installer will create a folder called "TetrUSS" inside /Applications. After the installer runs, the following additional steps must be performed if not done already:

1) Add /Applications/TetrUSS/bin/ to your shell path. Mac OS X defaults to the bash shell for new user accounts unless you have specified otherwise (or have an account carried over from an older install of OS X). To find out what shell you're using, you can type "echo \$SHELL" at the command line and hit return.

For bash, manually add the following commands to a ".bash_profile" file in the home directory of each user that wants to run TetrUSS:

```
export TETR USS=/Applications/TetrUSS
export PATH=$PATH:$TETR USS/bin
```

For tcsh (previous default in OS X before 10.3.x) or csh shells, manually add the following to the ".tcshrc" or ".cshrc" (respectively) file in the home directory of each user that wants to run TetrUSS:

```
setenv TETR USS /Applications/TetrUSS
set path = ($TETR USS/bin $path)
```

For other shells, use equivalent commands to put /Applications/TetrUSS/bin/ in your path.

Description of Software

GTC (GridToolCocoa) 2010

Double click this app's icon to launch, or type "gtc" at the command line. This version of GTC contains numerous bug fixes and usability enhancements, and includes support for VGRID 4.1 features. GTC will expire on January 1, 2011; a revised version will be released to registered users in late December 2010.

VGRID / POSTGRID 4.1

These programs are available in 32- and 64-bit versions for Intel Macs running OS X 10.5-10.6. The executable names are vgrid4.1_Intel32, vgrid4.1_Intel64, postgrid4.1_Intel32, and postgrid4.1_Intel64. Please see the "VGRID_4.1_ReadMe" file for more details. VGRID and POSTGRID 4.1 will expire on January 1, 2011; revised versions will be released to registered users in late December 2010.

VGRID / POSTGRID 3.9

These programs are included for compatibility with Mac OS X 10.4 or PowerPC Macs, and are available in 32-bit versions only. The executable names are vgrid3.9 and postgrid3.9. They will also run on Intel Macs and OS X 10.5-10.6.

PREFACE 4.4

A preprocessor used to prepare a face-based connectivity data structure from a cell-based tetrahedral grid generated by VGRID. The code also computes distance parameters between cell centers and solid surfaces. For use in conjunction with the unstructured flow solver USM3D.

PROJECTOR

Utility for projecting surface grid points generated by VGRID on non-NURBS surface patches. Not required if the input geometry is defined in terms of NURBS (Type 2) patches, or if projection is not desired.

USM3D 5.2

The following USM3D command line executables are included in Mac TetrUSS:

Single Processor

usm3d.r4.32	(Intel/PowerPC, single precision, 32-bit)
usm3d.r8.32	(Intel/PowerPC, double precision, 32-bit)
usm3d.r4.64	(Intel/PowerPC-G5, single precision, 64-bit)
usm3d.r8.64	(Intel/PowerPC-G5, double precision, 64-bit)

Parallel Processors

usm3dp.r8.32	(Intel/PowerPC, double precision, 32-bit)
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The 64-bit executables need only be used when large amounts of memory are required.

You can type "usm3d.x.y -s projname" at the command line to check on memory requirements before running the code. Some general memory guidelines are given below:

Grid Size (Cells)	Single Precision Memory (MB)	Double Precision Memory (MB)
100000	72	144
500000	360	720
1000000	720	1440
2000000	1440	2880
3000000	2160	4320
5000000	3600	7200
10000000	7200	14400

The parallel version of USM3D (usm3d52p.r8.32) allows CFD problems to be split up and run in parallel, on 2 to 200 processors, to take advantage of distributed memory and/or speed-up computations. The parallel USM3D software is based on LAM-MPI, and requires a properly built, configured, and tested LAM 7.1.1-7.1.2 installation (in /usr/local/lam) to run (LAM is not included with TetrUSS, but can be downloaded separately from the Mac TetrUSS website). The parallel USM3D software is typically run with the command:

```
mpirun -machinefile hostfile /Applications/TetrUSS/bin/usm3d52p.r8.32 projname
```

where "hostfile" is a text file containing hostnames and CPU specifications for machines used in the computation, for example:

```
localhost cpu=4  
pabm16 cpu=2  
pabm17 cpu=2  
pabm18 cpu=2  
pabm19 cpu=2
```

(this example uses 12 processors; 4 on the local quad-core machine and 8 from 4 other dual-core hosts). Note that additional pre-processing steps are required at the command line **before** running the parallel USM3D:

```
dconv53 projname  
partnm53 projname N
```

where N is the number of CPUs to be used. Both of these utilities are included with Mac TetrUSS, and are located in /Applications/TetrUSS/bin.

histPlot

Drag a USM3D "hist.plt" file onto the histPlot icon in the finder or dock, or use the "File->Open" menu option within histPlot to quickly plot the convergence history. histPlot can also be run from the command line. Just type "histplot hist.plt" (the input file can have any name and you can specify the path to the file in another directory). By default, histPlot will auto-scale all plots and

plot every other point. If a text file named "hist.cont" is located in the current working directory, it will override these settings. The format of hist.cont is:

nskip		
2		
logR/Ro	min	max
1	-4.	1.
CL	min	max
1	0.1	0.5
CD	min	max
0	0.	0.
CDV	min	max
0	0.	0.
Cm	min	max
1	-0.2	0.1
CFL	min	max
0	0.	0.
logT/To	min	max
0	0.	0.

Setting nskip will govern how many points are used in the plots (raise nskip for faster rendering, lower nskip for better resolution). The minimum setting for nskip is 1. For manual control of plot limits for the various parameters, set the parameter's flag to 1 (or leave at 0 for auto-scale) and specify min and max limits. The x-axis range is auto-scale only.

Tet2Tec

This utility converts TetrUSS solution and project files into Tecplot format. It can be run from the command line (type "tet2tec" at the command line for options) or using the Tet2Tec app/droplet.

Input files required:

- .flo file (formatted, not needed for "Grid Only" option)
- .cogsg file (unformatted)
- .bc file (formatted)
- .mapbc file (formatted)

Using the command line "tet2tec" utility, filenames can be specified individually, or by project name. Using the app, files can be chosen using the "choose" button, which requires you to choose all input files at the same time (use shift-click and/or command-click to choose multiple files from within the file browser). Using the app in droplet mode, drag and drop the input files onto the Tet2Tec icon in the finder or dock.

Based on the menu options chosen in the app/droplet (which can be set as defaults using the "Set Defaults" button), Tet2Tec will process the input files and create ASCII ".dat" and/or binary ".plt" files in Tecplot format.

Training and Support

Please note that NASA Langley is no longer handling training, application support, or user support of the TetrUSS software; these services are now provided by Vigyan at a reasonable cost. For more information, see:

http://www.vigyan.com/tetruss_training/
tetruss_training@vigyan.com
(757) 865-1400

If you are in need of training or consultation, please contact Vigyan to setup an appropriate support plan.

For issues with the Mac OS X TetrUSS software, including installation problems and bug reports, please contact Craig Hunter by e-mail at: craig.hunter@nasa.gov. Issues should pertain to the TetrUSS software itself; I am unable to answer basic questions regarding OS X, the terminal, or third party software.

Resources on the Web

Main TetrUSS web page:
<http://tetruss.larc.nasa.gov/>

Mac OS X TetrUSS web page:
<http://aaac.larc.nasa.gov/tsab/tetruss/mac/>

USM3D Online Manual:
http://aaac.larc.nasa.gov/tsab/usm3d/usm3d_52_man.html

GridTool Documentation:
http://geolab.larc.nasa.gov/GridTool/GridTool_Doc.html

GridTool Training Manual:
<http://geolab.larc.nasa.gov/GridTool/Training/GridTool/>

VGRID Training Manual:
<http://geolab.larc.nasa.gov/GridTool/Training/VGRID>